MISCELLANEOUS PAPERS

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Centre for Entomological Studies Ankara

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No 213 **29 June 2020** **ISSN/eISSN 1015-8235**

http://zoobank.org/References/1AE1B982-BBBF-40C4-B1FA-B412E8684AD9

Agonopterix kayseriensis, a new species of the *Agonopterix alpigena* group (Lepidoptera: Depressariidae) from Turkey and Romania

Peter Buchner [1]

Abstract: *Agonopterix kayseriensis*, a new species of the *Agonopterix alpigena* group (Lepidoptera: Depressariidae) from Turkey and Romania. *Misc. Pap*. 2013: 1-18.

Agonopterix kayseriensis, a new species of the *Agonopterix alpigena* group (Lepidoptera: Depressariidae) from Turkey and Romania is described. The new species belongs to the *A. alpigena*-group. Externally it is inseparable from *A. socerbi* (ŠUMPICH, 2013), a species known only from Italy and Slovenia so far, male genitalia are distinctly different. *A. coenosella* (ZERNY, 1940) can be found at the same places and can be very similar externally, determination is possible by male genitalia. *A. babaella* AMSEL, 1972 is most similar in male genitalia, but with clearly different external appearance. These three compared species are also safely discernable by DNA-barcode, but not by female genitalia. The moth and the genitalia of the new species and some of its related species are illustrated.

Keywords: Lepidoptera, Depressariidae, *Agonopterix*, Turkey, Romania, new species, DNA barcoding.

Introduction

In the collection of ZMUC (Copenhagen) and the private collections RCGB, RCKL and RCJJ, specimens of an *Agonopterix* from Turkey were found in year 2017, which - if fresh - immediately stood out due to its bright brick-reddish colour, so far only known from *A. socerbi* (ŠUMPICH, 2013) and inseparable from this species externally, but with clearly different genitalia. But features of male genitalia appeared puzzling and attempts to find diagnostic differences to separate this unnamed species from *Agonopterix coenosella* (ZERNY, 1940) and *A. babaella* AMSEL, 1972 turned out to be surprisingly difficult. So with all known specimens collected in Turkey, it was decided that its description should be postponed until after the completion of "Microlepidoptera of Europe: Depressarinae". While selecting male genitalia for the illustrations of this volume, a slide of a worn, previously undetermined *Agonopterix* from Romania, coll. MGAB (Bucharest), was re-checked and turned out to belong to the species described here. Additionally, specimens of this new species from the European part of Turkey were found in the collection of Günter Baisch, making it impossible to postpone description to a date after publication of "ME: Depressariinae". On rechecking all specimens, a series of 9 specimens from Nevshehir, Ürgüp, 2. vii. 1987, all very similar externally and therefore all initially determined as *A. kayseriensis* sp.n. were found to include two species: *A. kayseriensis* and *A. coenosella*, details below under paragraph "Diagnosis". Evidently the differences that had so far been attributed to intraspecific variability are actually based on specific differences. This made it possible to put genitalia of *A. coenosella, A. babaella* and *A. kayseriensis* sp.n. into consistent groups. With nearly all specimens of the new species collected in Turkey, it is appropriate to publish this description in a Turkish journal, which also makes it possible to present a more expanded comparison, including non-European species.

[1] Mag. Peter Buchner, Scheibenstraße 335, 2625 Schwarzau am Steinfeld, Austria. E-mail: buchner.324@drei.at (formerly buchner.324@tele2.at)

Methods

Morphological examination: genitalia preparations followed standard techniques (Robinson, 1976). Male preparations were stained with mercurochrome and females with chlorazol, which brings a better result than using the same stain for both sexes.

Photographic documentation: photos of set specimens were taken with Canon EOS 5D Mark III and Canon lens EF 100mm 2.8 L IS USM at 1:1, illuminated with two external flashes and using a third flash to set the background whiteness. Photos of specimen details were taken with Canon lens MP-E 65 at 2:1, using ring flash. Genitalia photos were taken with microscope (Wild Heerbrugg) using a 10x objective and a 2.5x ocular. All photos were edited using the software Helicon Focus 4.80 and Adobe Photoshop 6.0.

Abbreviations

DEEUR "Depressariinae of Europe", prefix for specimen-number of Depressariinae studied by P. Buchner. This unique number is pinned to all those specimens for certain identification.
LMK Landesmuseum Kärnten, Klagenfurt, Austria
MGAB "Grigore Antipa" National Museum of Natural History, Bucharest, Romania
NHMW Naturhistorisches Museum, Vienna, Austria
NMBE Naturhistorisches Museum Bern, Switzerland
NMPC National Muzeum, Prague, Czech Republic
RCFG Research Collection of Friedmar Graf, Bautzen, Germany
RCGB Research Collection of Günter Baisch, Germany
RCGF Research Collection of Gabriele Fiumi, Italy
RCHB Research Collection of Hans Blackstein, Germany
RCJJ Research Collection of Jari Junnilainen, Finland
RCKL Research Collection of Knud Larsen, Denmark
RCLM Research Collection of Lucio Morin, Monfalcone, Italy
RCLS Research Collection of Ľubomír Srnka, Lehota pod Vtáčnikom, Slovakia
RCPB Research Collection of Peter Buchner, Schwarzau am Steinfeld, Austria
SMNK Staatliches Museum für Naturkunde, Karlsruhe, Germany
TLMF Tiroler Landesmuseum Ferdinandeum, Innsbruck, Austria
ZIN Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia
ZMHB Museum für Naturkunde der Humboldt-Universität, Berlin, Germany
ZMUC Zoological Museum, University of Copenhagen, Denmark

Agonopterix kayseriensis sp. nov.

http://zoobank.org/NomenclaturalActs/EE3097E3-1018-4DD6-8EAF-EB80947DD028

Type Material

Holotype :
♂, NW Turkey, Çanakkale Province, Kurudağı geçidi, 350m, 26. vi. 2001, gen. prep. DEEUR 4375, DNA barcode id. TLMF Lep 19256, G. Baisch leg., will be deposited in coll. SMNK.
Paratypes (arranged according to collection date):
1 ♂, Central Turkey, Kayseri Province, 5 km northwest Erciyes Dağı, 2000m, 22. vii. 1986, DEEUR 5476, M Fibiger leg., coll. ZMUC, will be deposited there.
3 ♂, 1 ♀, Central Turkey, Nevşehir Province, Ürgüp, 1300 m, 2. vii. 1987, DEEUR 5495 (DNA barcode id. MFN-30134-H11), 5498, 5500 (3♂), DEEUR 5504 (♀), M. Fibiger leg., coll. ZMUC, will be deposited there.
1 ♂, Central Turkey, Nevşehir Province, Ürgüp, 1300 m, 2. vii. 1987, gen. prep. DEEUR 3117 P. Buchner, M. Fibiger leg., will be deposited in coll. RCKL.
1 ♂, NE Turkey, Gümüşhane Province, Kop geçidi, 2400m, 14. ix. 1993, gen. prep. DEEUR 2369 P. Buchner, DNA barcode id. TLMF Lep 19024, M. Fibiger leg., coll. ZMUC, will be deposited there.

1 ♀, Central Turkey, Kayseri Province, Incesu, 1100m, 27. vii. 1996, gen. prep. DEEUR 2381 P. Buchner, DNA barcode id. TLMF Lep 17706, K.E.Stovgaard leg., coll. ZMUC, will be deposited there.
2 ♀, NW Turkey, Çanakkale Province, Kurudağı geçidi, 350m, 1. vii. 1997, DEEUR 4376 & 4377, G. Baisch leg.,will be deposited in coll. SMNK.
1 ♂, Central Turkey, Nevşehir Province, 5 km northwest Ürgüp, 17. vi. 1999, gen. prep. DEEUR 4568 P. Buchner, DNA barcode id. TLMF Lep 21939, J. Junnilainen leg., will be deposited in coll. RCJJ.
1 ♂, NE Turkey, Gümüşhane Province, Kösedağı geçidi, 1850m, 16. vii. 2000, gen. prep. DEEUR 3360 P. Buchner, DNA barcode id. TLMF Lep 21984, K. Larsen leg., will be deposited in coll. RCKL.
1 ♀, Central Turkey, Yozgat Province, Çiçek dağları, 1300m, 3. vii. 2001, DEEUR 4373, G. Baisch leg., will be deposited in coll. SMNK.
1 ♂, Turkey, Erzurum Province, 10 km south İspir, 26. vii. 2001, gen. prep. DEEUR 5767 P. Buchner, DNA barcode id. TLMF Lep 23182, B. Schacht leg., coll. ZMHB, will be deposited there.
1 ♂, NW Turkey, Çanakkale Province, Kurudağı geçidi, 350m, 27. vi. 2001, gen. prep. DEEUR 4372, DNA barcode id. TLMF Lep 19254, G. Baisch leg., will be deposited in coll. SMNK.
1 ♂, Romania, “Grum.” [Neamt County, Grumazesti], 8. viii. [no year listed], gen. prep. DEEUR 6286 P. Buchner, [no collector listed], coll. MGAB, will be deposited there.

Description

Imago (figs 1 - 4, 6 - 10): Wingspan 14 - 17 mm. Scales of head pale yellowish brown. Labial palp: second segment very pale yellowish throughout on inner side, interspersed with medium to dark brown scales on outer side, third segment very pale yellowish, with darker scales interspersed in different proportions on outer side (figs 8 - 10). Antenna dark greyish brown, distinctly more stout in males than in females, which is the only sex-associated difference. Thorax with posterior crest, yellowish brown to brick-red with a tendency to be darker in frontal and central parts, tegulae similar. Forewing: ground colour rich brick red (red with yellow component) in fresh specimens collected in June to mid-July (this distinct appearance is elusive and soon turns to pale yellowish buff), along costa irregular groups of blackish scales can be present or not, only at its very base a blackish spot is usually present; basal field paler than ground colour, but contrast varies from moderate (fig. 1) to distinct (fig. 4), in rear half contrast is more obvious with presence of a darkened zone in forewing, in frontal half it becomes broader and gradually passing into a stripe slightly paler than ground colour which runs along costa especially in proximal third; central forewing pattern: outer pair of dots with always distinct white-centred distal dot, proximal dot similar, usually smaller, rarely nearly absent (fig. 3), this area surrounded by a distinct diffuse dark reddish brown to blackish field with 1 - 1.5 mm extension; inner pair of dots present, both accompanied by white scales especially on distal side (figs 1, 3 - 4, 6); a third, somewhat elongated blackish dot usually present at half distance to dorsal forewing margin on the fold; a slightly paler zone forming an acute angle of about 75°, directed toward apex, is usually developed at ¾, the area distal to it often contrasting against basal ¾ by irregularly interspersed blackish scales (fig. 1), blackish interneural dots present, but not always distinct; fringe similar to ground colour of forewing; lower side of forewing uniformly dark greyish brown, only along costa and termen with some paler patches. Hindwing rather dark greyish, with a tendency to be more pale and translucent at base, fringe similar to ground colour, with a diffuse darker fringe line near the base. Legs: forelegs predominantly dark grey, only tarsal segments with pale yellowish rings, yellowish elements becoming more extensive in mid- and hindlegs (figs 2, 9). Abdomen medium greyish on dorsal side, paler with two dark spots on each segment on ventral side.

Variation: on forewings especially contrast of basal field against ground colour, number of irregularly interspersed dark scales, size of cell dots and extent of dark area around these dots vary. Ground colour of forewing soon fades in this species, so it is necessary to exclude older specimens from this comparison.

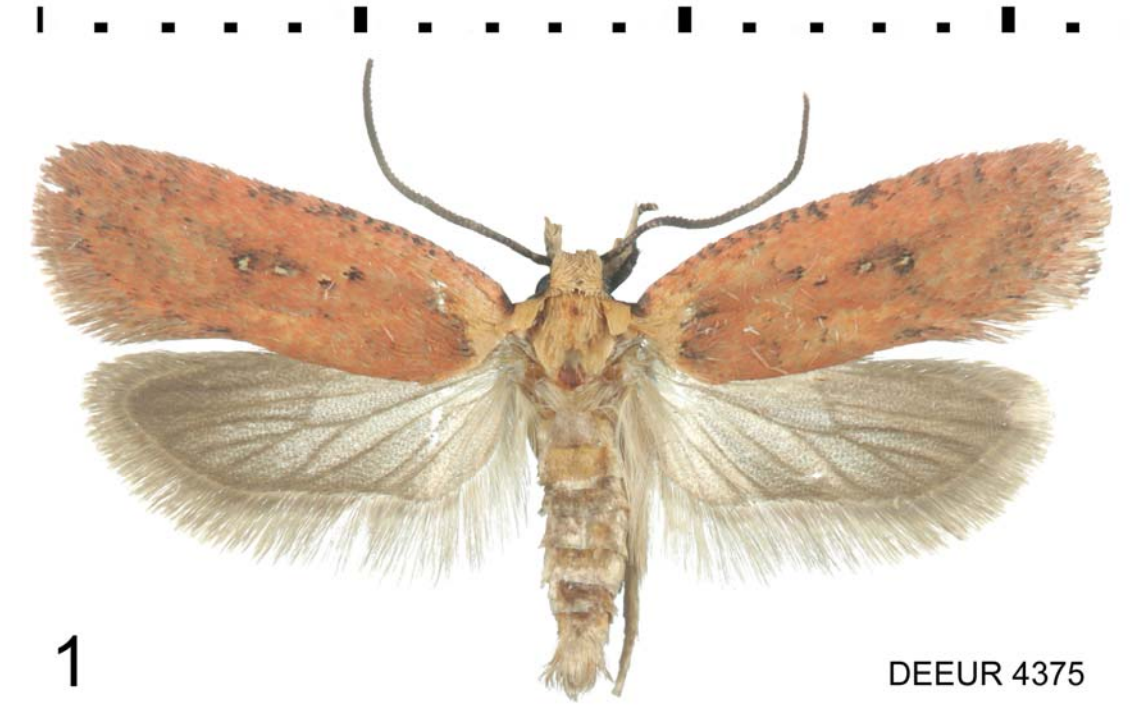
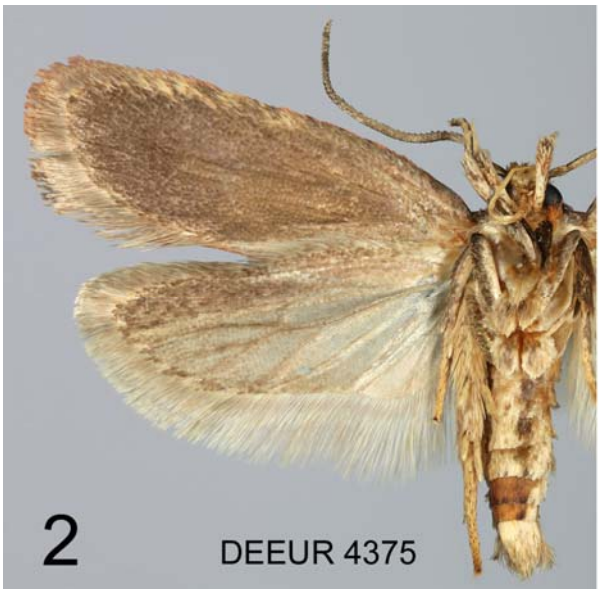


FIGURE 1: *A. kayseriensis*, holotype, general view



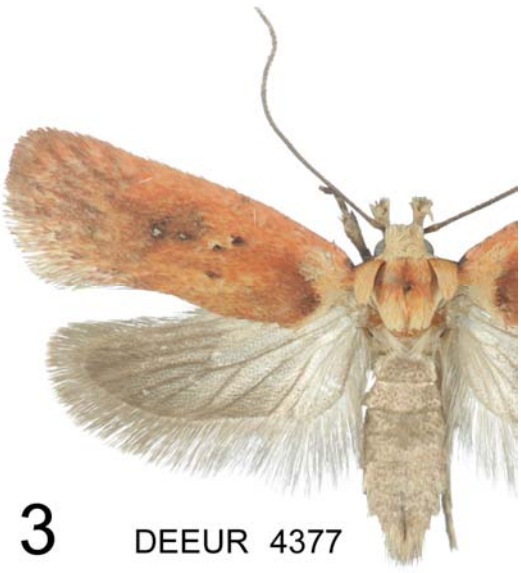
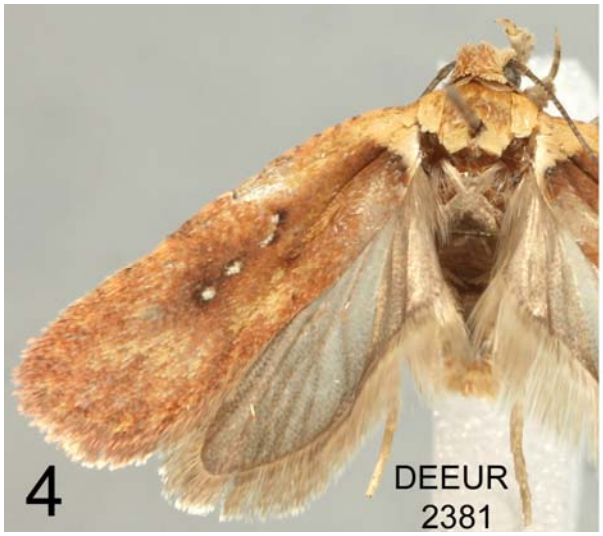


FIGURE 2: *A. kayseriensis*, holotype, underside.
FIGURE 3: *A. kayseriensis*, paratype.



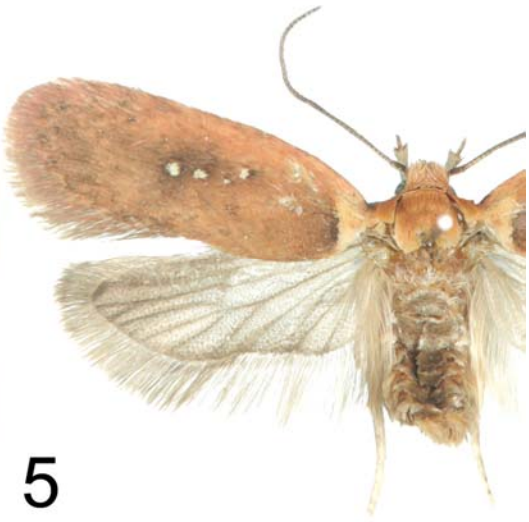
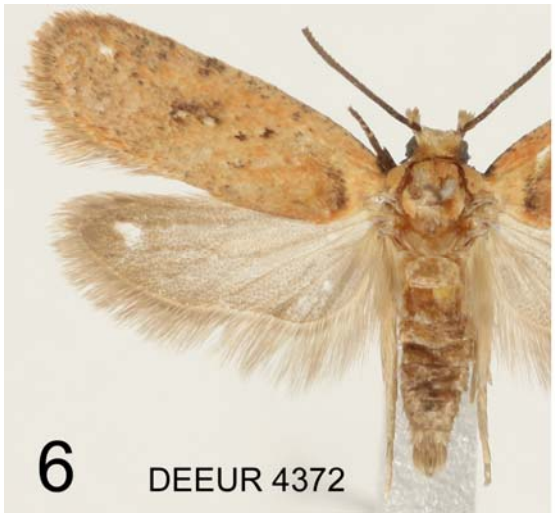
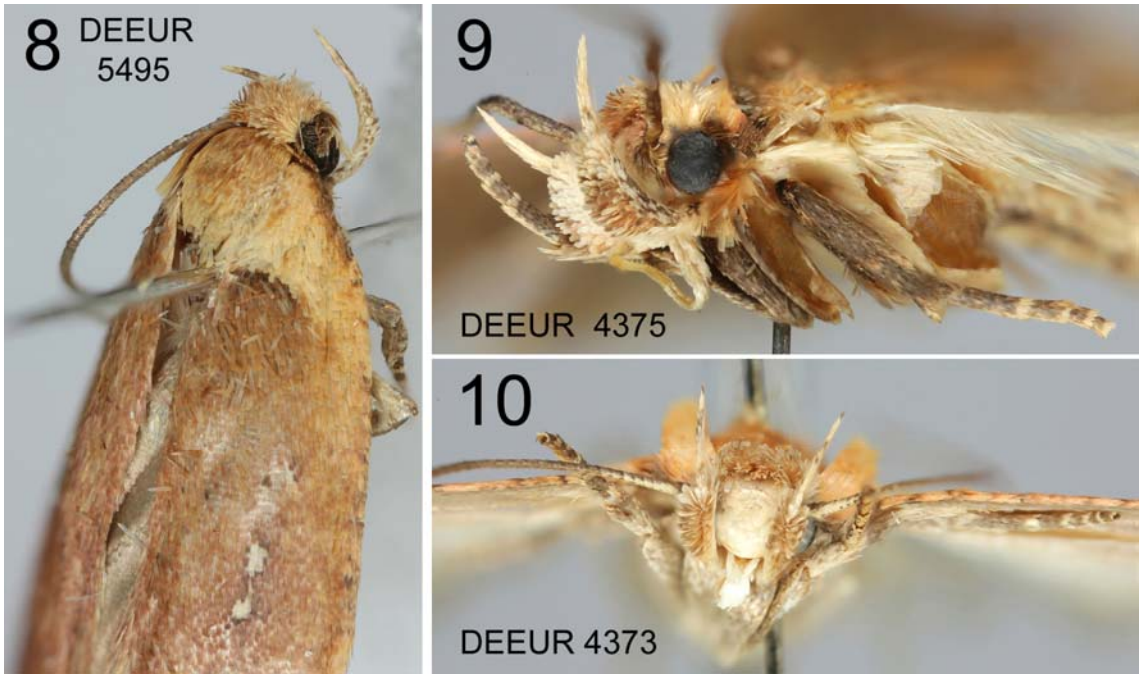


FIGURE 4: *A. kayseriensis*, paratype.
FIGURE 5: *Agonopterix sp.,* ♀, Greece, Parnassos, Delphi, 700 m, leg. larva from "Fenchel" [may be *Foeniculum sp*. or *Ferulago sp*. or another Apiaceae], e.l. 11. VI. 1984, gen. prep. DEEUR 4374 P. Buchner, G. Baisch leg., coll. SMNK. For genitalia see fig. 19, for determination problems see paragraph "Differential diagnosis"



FIGURES 6-7: *A. kayseriensis*, paratypes.



FIGURES 8-10: *A. kayseriensis*, labial palps, holotype (fig. 9) and paratypes (figs 8 & 10).

Male genitalia (figs 11 - 15):

Socii medium-sized, broadly elliptic, 0.2 - 0.25 mm wide and 0.2 - 0.25 mm long, uncus triangular, indistinct, gnathos elliptic, medium-sized, 0.2 - 0.25 mm long, width/length ratio 1: 2 - 2.5, overtopping socii in standard preparation by about one-third to two-thirds of its length. Transtilla distinctly widened medially up to 0.05 - 0.08 mm in its middle, transtilla lobes semi-elliptic, about 0.08 - 0.1 mm wide and 0.15 - 0.18 mm long, nearly touching each other and overlapping transtilla and caudal parts of anellus processes in standard preparation; anellus medium-sized, main part - with caudal end marked by thickenings that protrude from the two side edges - 0.15 (0.2) mm wide and 0.2 (0.25) mm long, continued by a membrane toward transtilla with total length of about 0.05 mm which terminates with 2 distinct triangular processes, gap to transtilla 0.03 - 0.05 mm, anellus lobes medium-sized, narrow elliptic, length/width about 0.2/0.08 mm, with a distinct bulge toward transtilla which gives them a semicordate appearance, caudal edge of this bulge usually reaching the thickenings at caudal end of main part of anellus. Valva with median length of about 0.8 - 0.9 mm, 0.5 - 0.6 mm broad at base with average *Agonopterix*-characters by costa being slightly concave over nearly all of its length, lower edge convex in basal ¼, becoming concave in area of origin of cuiller, again becoming convex in its middle and continuing concave or nearly straight in its distal ¼ until it reaches the round tip. Cuiller rather stout (medium width about 0.05 mm in its middle), in standard preparation S-shaped with its basal 3/4 bent outwards, the distal ¼ swollen and bent inwards, this part being more or less warty and ending with a blunt tip directed obliquely towards costa, ending about 0.05 mm before it. Aedeagus 0.7 mm long, in lateral view evenly bent (60°), diameter 0.07 - 0.08 mm except the slightly swollen basal part, tapering to a sharp tip in its terminal ¼; sclerotised basal parts with a total length of about 0.3 mm, free section about 0.2 mm, in ventral view constricted to half of width of aedeagus in its middle, in terminal 1/3 expanding to aedeagus width, terminating slightly convex. Vesica (uneverted) with numerous tiny cornuti in a diffuse group of about half of aedeagus length.

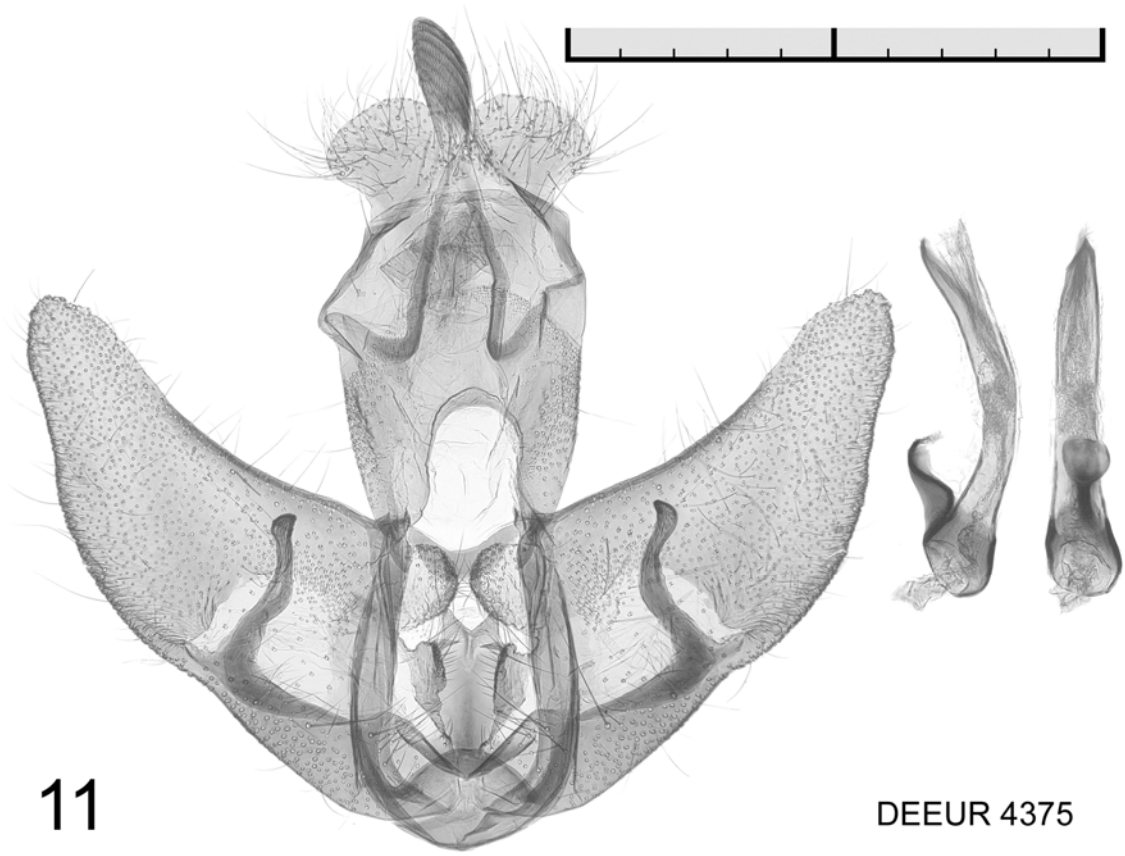


FIGURE 11: *A. kayseriensis*, holotype.

FIGURES 12-13: *A. kayseriensis*, paratypes.

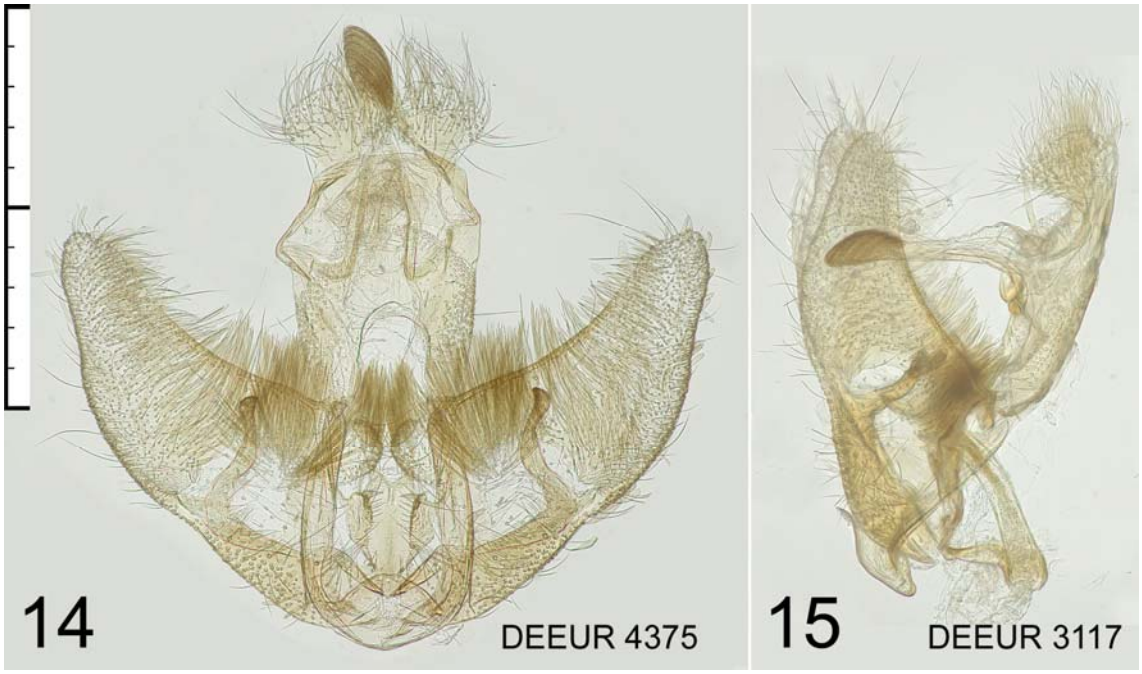
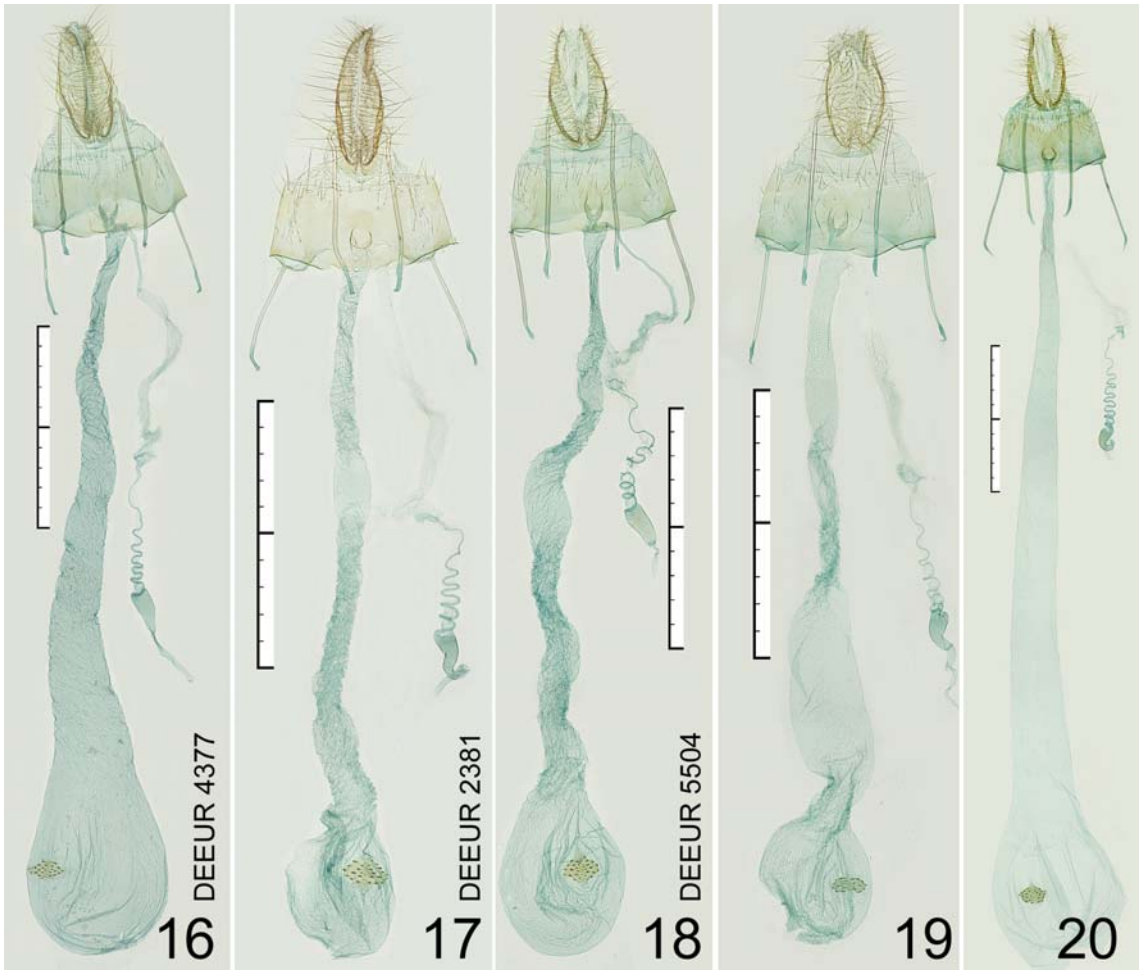


FIGURE 14: *A. kayseriensis*, male genitalia opened, bristles not removed, holotype
FIGURE 15: *A. kayseriensis*, male genitalia unopened, free floating, lateral view, bristles not removed, paratype

Female genitalia (figs 16 - 18):

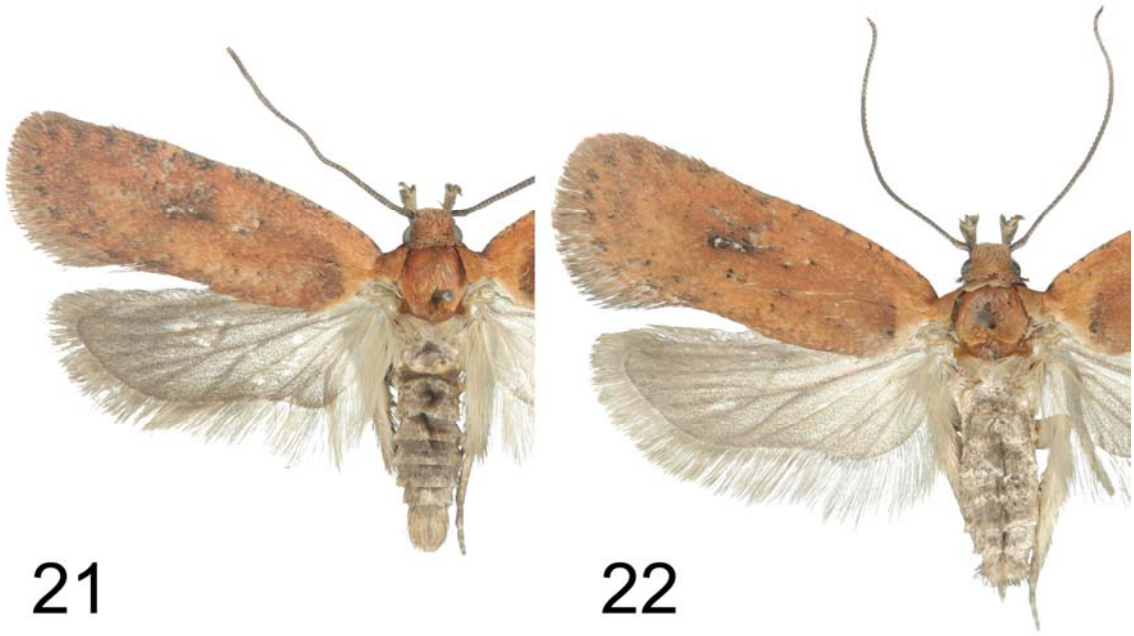
Papilla analis 0.5 - 0.6 mm long, posterior apophysis 0.7 mm. Sternite VIII 0.3 mm long, maximum width 0.7 - 0.75 mm in standard preparation, anterior apophysis 0.4 - 0.5 mm. Proximal edge of sternite VIII rather straight to slightly convex with a slightly concave section on either side of its middle, without distinct folds. Ostium slightly proximal to the middle of sternite VIII, round or a little longer than wide with a diameter of about 0.1 mm, area of stronger sclerotisation between ostium and distal edge of sternite VIII. Ductus bursae starting with a width of about 0.1 mm without distinct structures apart from numerous tiny dots, after 0.5 - 0.6 mm the tiny dots disappear and ductus shows irregular folds, after a total length of 2.0 - 2,5 mm it widens to corpus bursae (structure and width of ductus and corpus bursae vary with age, especially if the specimen has mated or not, so it is not useful to specify more details here); signum transverse elliptic (longitudinal/transverse expansion 0.1 - 0.15/0.15 - 0.2 mm) with about 20 triangular, distinct teeth, additionally tiny teeth may be present in different number. Ductus spermathecae originates in area of proximal edge of sternite VIII and ends with about 6 turns.



FIGURES 16-18: *A. kayseriensis*, paratypes
FIGURE 19: *Agonopterix sp.*, ♀, Greece, Parnassos, Delphi, 700 m, leg. larva from "Fenchel" [may be *Foeniculum sp.* or *Ferulago sp.* or another Apiaceae], e.l. 11. VI. 1984, gen. prep. DEEUR 4374 P. Buchner, G. Baisch leg., coll. SMNK. For general view see fig. 5, for determination problems see paragraph "Differential diagnosis"
FIGURE 20: *A. socerbi*, Slovenia, Petrinjski Kras, Crnotice Praproce, 420 m, 1. ix. 2011, gen. prep. DEEUR 8316 P. Buchner, H. Habeler leg., coll. TLMF.

Differential diagnosis.

Externally, the most similar species is *Agonopterix socerbi* (figs 21 - 22). It tends to have a darker thorax and smaller cell dots, but with only 6 fresh specimens available for comparison, it is too soon to be sure that this can serve as a tool for safe determination. Male genitalia of *A. socerbi* (fig. 23) are notable within *Agonopterix* in the transtilla, which is extremely widened in the middle, showing a drop-like outline in standard orientation, additionally by its unusual long anellus with prominent triangular processes and its cuiller, clearly exceeding costa of valva. In contrast, female genitalia show no feature for safe distinction from *A. kayseriensis*. This affects specimen DEEUR 4374 from Greece, Delphi (figs 5, 19). With neither species known from this area so far, it was not possible to be sure this single female belongs to *A. kayseriensis*, although external appearance points in this direction. DNA-barcodes, which also show clear differences, may help to clarify this in the future.



FIGURES 21-22: *A. socerbi*, Italy, Trieste, Basovizza, 6. vi. 2010, DEEUR 2141 (♂, fig. 21) & DEEUR 2140 (♀, fig. 22) P. Sonderegger leg., coll. NMBE.

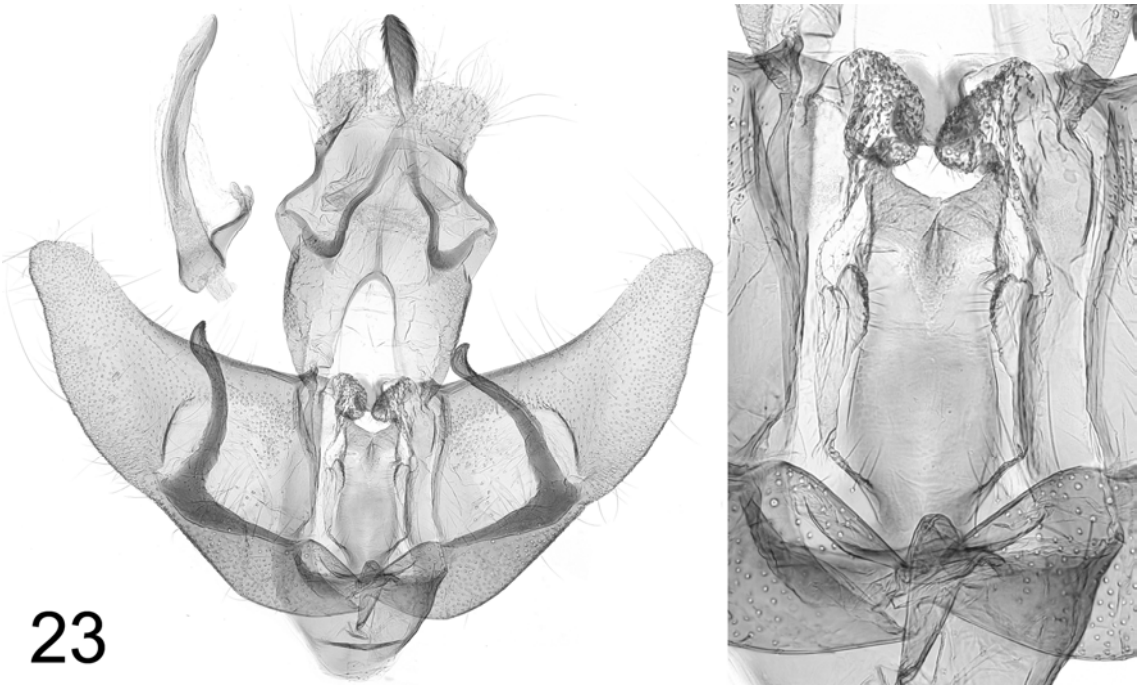


FIGURE 23: *A. socerbi*, paratype, male genitalia, general view (left) & anellus-region enlarged (right), Slovenia, Petrinjski Kras, 11. viii. 2002, DEEUR 1280, gen. prep. I. Richter, L. Srnka leg., coll. NMPC.

Several species show similar wing patterns, here *A. selini* (HEINEMANN, 1870) (fig. 24) and *A. lessini* BUCHNER, 2017 (fig. 25) are mentioned, but usually ground colour is different in being reddish brown (not yellowish brown) and basal field does not extend toward costa. Male genitalia (figs 26, 27) are clearly different in short, nearly circular gnathos and different shape of cuiller.

FIGURE 24: *A. selini*, Germany, Oberlausitz, 9. vi. 2007, e.l. *Selinum carvifolium*, DEEUR 1860, F. Graf leg., coll. RCFG.
FIGURE 25: *A. lessini*, paratype, Greece, Epirus, Zagoria, Dilofo, 650 m, 24. vi. 2012, DEEUR 1970, H. Blackstein leg., coll. RCHB.

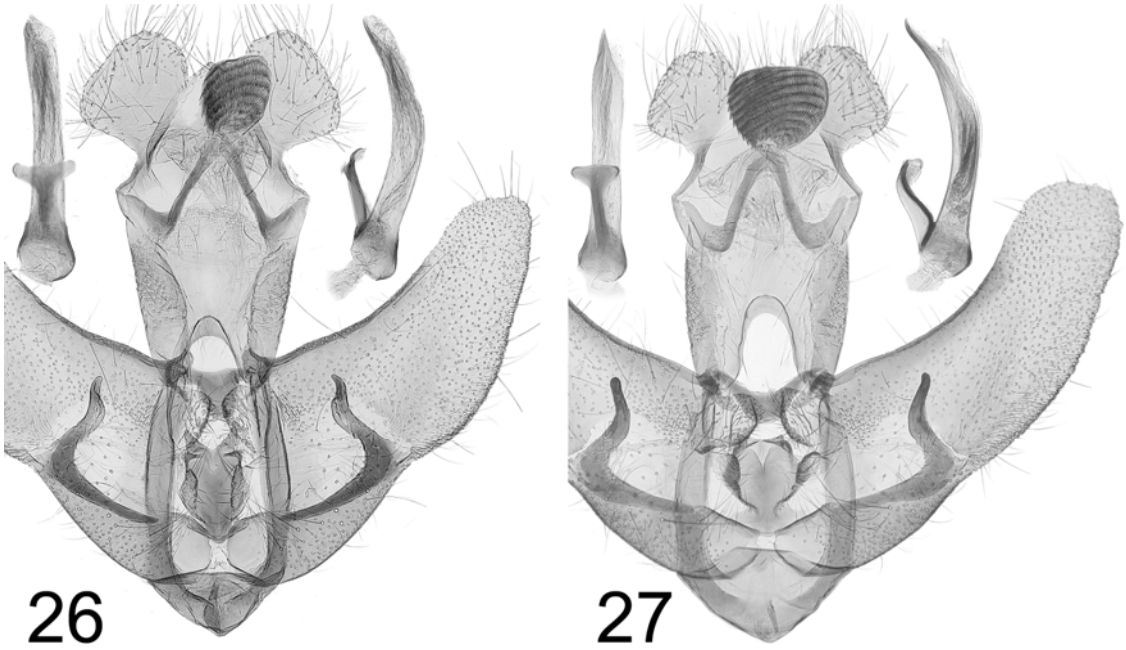


FIGURE 26: *A. selini*, Italy, Mt. Baldo, v. 1961, e.l. *Ligusticum lucidum*, gen. prep. DEEUR 1579 P. Buchner, K. Burmann leg., coll. TLMF.
FIGURE 27: *A. lessini*, Italy, Friuli V.G., Carso Goriziano, 8. ix. 2011, gen. prep. DEEUR 5155 P. Buchner, L. Morin leg., coll. RCLM.

A. coenosella and *A. babaella* that were found in the checked collections were distinctly different externally in grey ground colour and scales with noticeably paler tips scattered throughout the forewings, which gives them a mottled appearance. When starting this investigation, it was not expected that separation of *A. kayseriensis* from one of these two species by external features could be a problem - but it was. In ZMUC and RCKL 10 unset specimens from one collection series (Ürgüp, 2. VII. 1987, leg. M. Fibiger), 7 males and 3 females, had been found. One female has grey forewings, it had been barcoded and turned out to be *A. coenosella*. The other 9 have warm brown forewings and one dissected male showed genitalia features of *A. kayseriensis*. At that time it seemed certain that all these 9 warm brown specimens are conspecific. Subsequently further males from this series were dissected with a puzzling result: genitalia features overlap with *A. coenosella*, and at this stage it was impossible to present a consistent diagnosis of genitalia features of *A. kayseriensis*. So further specimens from this series were barcoded, showing that it consists of both

A. coenosella and *A. kayseriensis*. After sorting according to barcode results, external features and genitalia were re-checked and consistent differences were found. *A. coenosella* from this series have a small dark brown line on frontal edge of thorax, sharply contrasting with pale yellow rest of thorax (fig. 33a), and reddish colour of costa extends into basal field (fig. 33b), while in *A. kayseriensis* thorax has a diffuse darker area extending into the centre and pale colour of basal field extends onto costa (fig. 34). In male genitalia of *A. coenosella* usually cuiller is clearly different in being outcurved and ending in a sharp tip (fig. 30), but this feature is variable and cuiller can also have blunt end (fig. 31) and can even be incurved at distal third, reminiscent of that of *A. kayseriensis* (fig. 32). Further discerning feature (in order of reliability): in *A. coenosella* (figs 30 - 32) distance separating transtilla lobes in standard preparation at least half of transtilla length, transtilla only indistinctly widened in its middle, triangular processes of anellus small, anellus lobes not reaching thickening of anellus and basal process of aedeagus with 90° angle with convex aedeagus wall in lateral view; in *A. kayseriensis* (figs 11 - 15) transtilla lobes nearly touching each other, transtilla distinctly widened in its middle, triangular processes of anellus large, anellus lobes reaching thickening of anellus and basal process of aedeagus tends to show an acute angle in lateral view.

A. babaella (fig. 29), a species not known from the range of *A. kayseriensis* so far, is closely related to *A. coenosella* and *A. alpigena*, but not as close to *A. kayseriensis* according to barcode. So far only grey specimens had been found, inseparable from typical *A. coenosella* (fig. 28), but clearly different from *A. kayseriensis*. Male genitalia are usually different from *A. kayseriensis* in longer cuiller, nearly reaching costa of valva (fig. 35), but also specimens with shorter cuiller (fig. 36) and then inseparable from this species can be found.

Remark on external features of *A. coenosella* and *A. babaella*: the collection series from Ürgüp revealed that *A. coenosella* is more variable externally than previously considered. The closely related species *A. alpigena* shows a wide range of external appearance, which makes it likely that *A. coenosella* and *A. babaella* are also more variable than known so far, therefore the external features presented here should be taken as provisional.

FIGURE 28: *A. coenosella*, Iran, Khorasan, Golestan-NP, Almeh valley, 1540 m, 23. v. 2001, DEEUR 8429, P. Huemer leg., coll. TLMF.

FIGURE 29: *A. babaella*, Iran, Khorasan, Golestan-NP, Almeh valley, 1540 m, 23. v. 2001, DEEUR 8374, P. Huemer leg., coll. TLMF.

FIGURE 30: *A. coenosella*, Russia, Orenburg Oblast, Mt. Verbljushka, 30. viii. 2011, gen. prep. DEEUR 1045 P. Buchner, L. Srnka leg., coll. RCLS.
FIGURE 31: *A. coenosella*, Tajikistan, 8. ix. 1947, gen. prep. DEEUR 5695 P. Buchner, Ю. Щемкин [Yu. Shchemkin] leg., coll. ZMHB.
FIGURE 32: *A. coenosella*, Central Turkey, Nevşehir Province, Ürgüp, 1300 m, 2. vii. 1987, gen. prep. DEEUR 3117 P. Buchner, M. Fibiger leg., coll. RCKL.

FIGURE 33: *A. coenosella*, Central Turkey, Nevşehir Province, Ürgüp, 1300 m, 2. vii. 1987, DEEUR 5502, M. Fibiger leg., coll. RCKL.
FIGURE 34: *A. kayseriensis*, paratype.

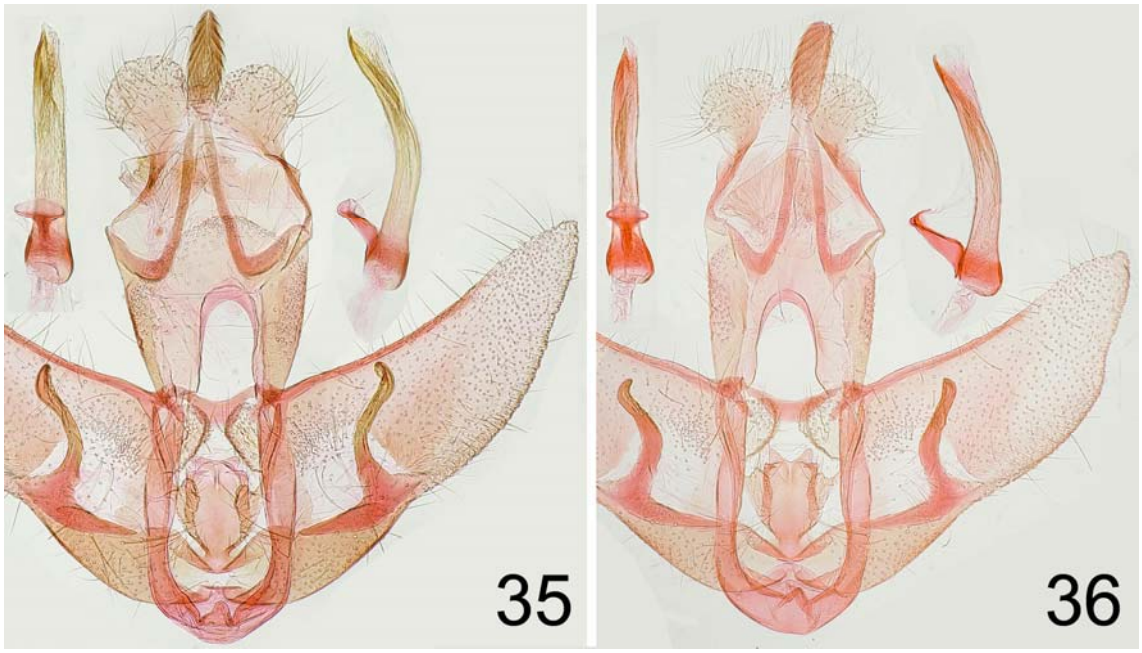


FIGURE 35: *A. babaella*, Kyrgyzstan, Tschitschkan, Tuartscha, 1650 m, 25. vi. 2010, gen. prep. DEEUR 5095 P. Buchner, Ch. Wieser leg., coll. LMK.
FIGURE 36: *A. babaella*, Afghanistan, Paghman, 30 km northwest Kabul, 2200 m, 8. vii. 1963, gen. prep. DEEUR 7284 P. Buchner, F. Kasy leg., coll. NHMW.

A. alpigena, a species so far known only from the area of the Alps, Apennine Mts. and Rhodope Mts. is very variable externally, but larger (wingspan usually 20 - 21 mm), male genitalia are most similar to that of *A. coenosella* with tendency for gnathos and cuiller to be shorter, but not always easy to separate from this species.

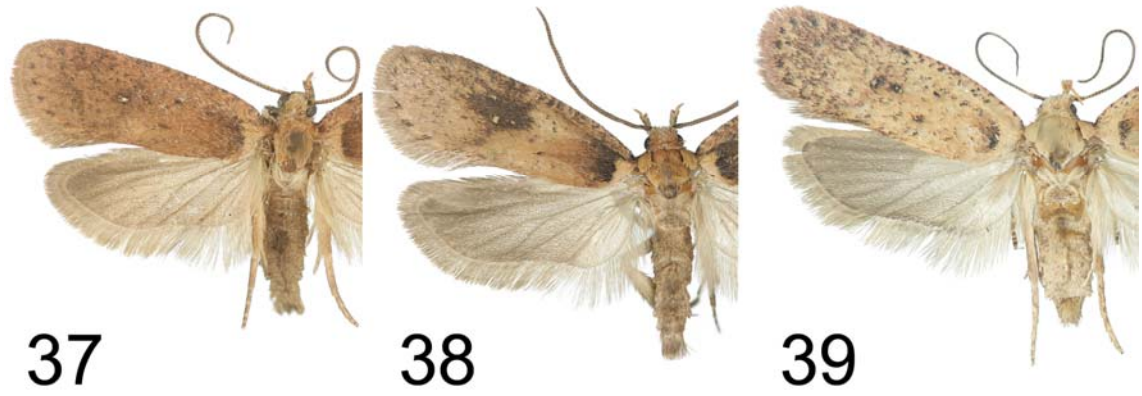


FIGURE 37: *A. alpigena*, Austria, south of Vienna, 24. vi. 1910, DEEUR 0156, no collector listed, coll. NHMW.
FIGURE 38: *A. alpigena*, Switzerland, Graubünden, Ardez, e.l. *Laserpitium siler*, 28. vi. 2005, DEEUR 0603, P. Sonderegger leg., coll. NMBE.
FIGURE 39: *A. alpigena*, Italy, Marche, Mt. Catria, 24. vii. 2018, DEEUR 6995, G. Govi leg., coll. RCGF.

FIGURE 40: *A. alpigena*, Austria, Hohe Wand, 13. vi. 2012, gen. prep. DEEUR 6873, P. Bucher leg., coll. RCPB.
FIGURE 41: *A. putridella*, Russia, Altai, Tigirek village, 9. vii. 2014, gen. prep. DEEUR 6615 P. Bucher, S. Sinev leg., coll. ZIN.
FIGURE 42: *A. salangella* Amsel, 1972, Afghanistan, Paghman, 30 km northwest Kabul, 2500 m, 18. vii. 1965, gen. prep. DEEUR 6824 P. Buchner, F. Kasy leg., coll. NHMW

Female genitalia of all compared species are so similar that an attempt to present diagnostic features appears more misleading than helpful.

Remark on the definition of "species"

Against the background of problems to present clear diagnostic features for all mentioned species, it is recommended to take a closer look at what is a "species". Although there exists no single definition, the most logical concept is the biological one. Following this, we only can talk about specific difference if there exists an internal reproductive barrier, but this can rarely be observed directly. Usually species are described using diagnostic features: if two or more independent features (e.g. external appearance and genitalia features and barcode) are found throughout in a distinct combination in one sample of specimens and different features also throughout connected in another sample, this can serve as proof of a reproductive barrier, because without such a barrier, the distinct combination of one type of features could not persist. Strictly, this works only if the populations are sympatric, but for practical reasons this is also used for allopatric populations (Mutanen et al. 2012). In the practice of describing species based on such differences there is a hidden trap: it easily can be forgotten that different features are NOT the base of specific difference, they only serve as indices for a reproductive barrier. The most important conclusion here can be drawn if the point of view is changed: absence of differences in visible features are NOT a proof for conspecifity. In genus *Agonopterix* there are a lot of examples where different species show poor reliable differences. Especially female genitalia can be too similar to serve for determination, even if male genitalia are remarkably different, compare *A. socerbi* (male: fig. 23, female: fig. 20) and *A. kayseriensis* (male: figs 11 - 15, female: figs 16 - 18). So it must not be expected, all species compared here in paragraph "Differential diagnosis" can be safely separated based on female genitalia. Even in male genitalia, where usually clear differences can be found, this is not always possible. In *Agonopterix*, the basic patterns are only slightly varied, and the same patterns may appear independently in species that are not closely related. Examples are shape of cuiller in *A. kayseriensis*, *A. putridella* (fig. 41) and *A. salangella* (fig. 42). On the other hand, *Agonopterix*-species are usually well characterized by their biology (hostplants, phenology), often additionally by larval features, all unknown from *A. kayseriensis*. However there are also many well-known species like *A. coenosella* and *A. babaella* where biological data are lacking. The description of this new species and the remarks given here also should be understood as a motivation to fill this gap.

Remark on species of the *Agonopterix alpigena* group (=*A. alpigena/selini* group sensu Buchner, 2017b) **found in Turkey**

In Koçak & Kemal (2009) no species of this group is listed, in Buchner (2017a) only *A. dideganella* AMSEL, 1972 is mentioned. In Buchner (2017b) findings of *A. selini* and *A. lessini* from Turkey had been published for the first time. In Kemal & Koçak (2017) a specimen with GP 2454 and provisional determination *A. subpropinquella* (STAINTON, 1849) belongs to *A. ordubadensis* HANNEMANN, 1959, which is also part of this group. In this paper *A. coenosella* and *A. kayseriensis* sp.n. are added, so actually 6 species from this group are known from Turkey.

Genetic data

8 specimens have been sequenced, here only mentioned with DEEUR-number and sample ID and sequence length. Details concerning collecting place and sequence quality are found in the type list (paragraph "Type Material"). Further data are accessible via the public dataset DS-DEEUR380 (http://www.boldsystems.org/index.php/Public_SearchTerms?query=DS-DEEUR380,

DOI: dx.doi.org/10.5883/DS-DEEUR380).

DEEUR 2369: TLMF Lep 19024, 658[on]bp
DEEUR 2381: TLMF Lep 17706, 658[on] bp
DEEUR 3360: TLMF Lep 21984, 658[on]bp
DEEUR 4372: TLMF Lep 19254, 454[on]bp
DEEUR 4375: TLMF Lep 19256, 658[on]bp
DEEUR 4568: TLMF Lep 21939, 658[on]bp
DEEUR 5495: MFN-30134-H11, 658[89n] bp
DEEUR 5767: TLMF Lep 23182, 658[on]bp

Related species

Barcode gap analysis, based on all full length sequences in the author's DNA-barcoding project DEPAL (Depressariidae of the Palaearctic region), show *A. alpigena* and *A. ferulae* (ZELLER, 1847) as the nearest species, both with 1.85% p-distance, followed by *A. babaella* with 2.0 %. The p-distances between the 3 species *A. alpigena, A. coenosella* and *A. babaella* are much smaller, compare the table below. Male genitalia are most similar to those of *A. babaella*, external appearance is nearly identical with *A. socerbi*. It can be concluded with certainty that *A. kayseriensis* is well nested in this species group, but it must remain open which is the closest species.

species	samples (full length sequences only)	nearest species	p-distance to nearest neighbour
Agonopterix alpigena	11	*Agonopterix babaella*	0.92
Agonopterix babaella	8	*Agonopterix coenosella*	0.76
Agonopterix coenosella	21	*Agonopterix babaella*	0.76
Agonopterix ferulae	6	*Agonopterix kayseriensis*	1.85
Agonopterix kayseriensis	6	*Agonopterix alpigena*	1.85
Agonopterix kayseriensis	6	*Agonopterix ferulae*	1.85

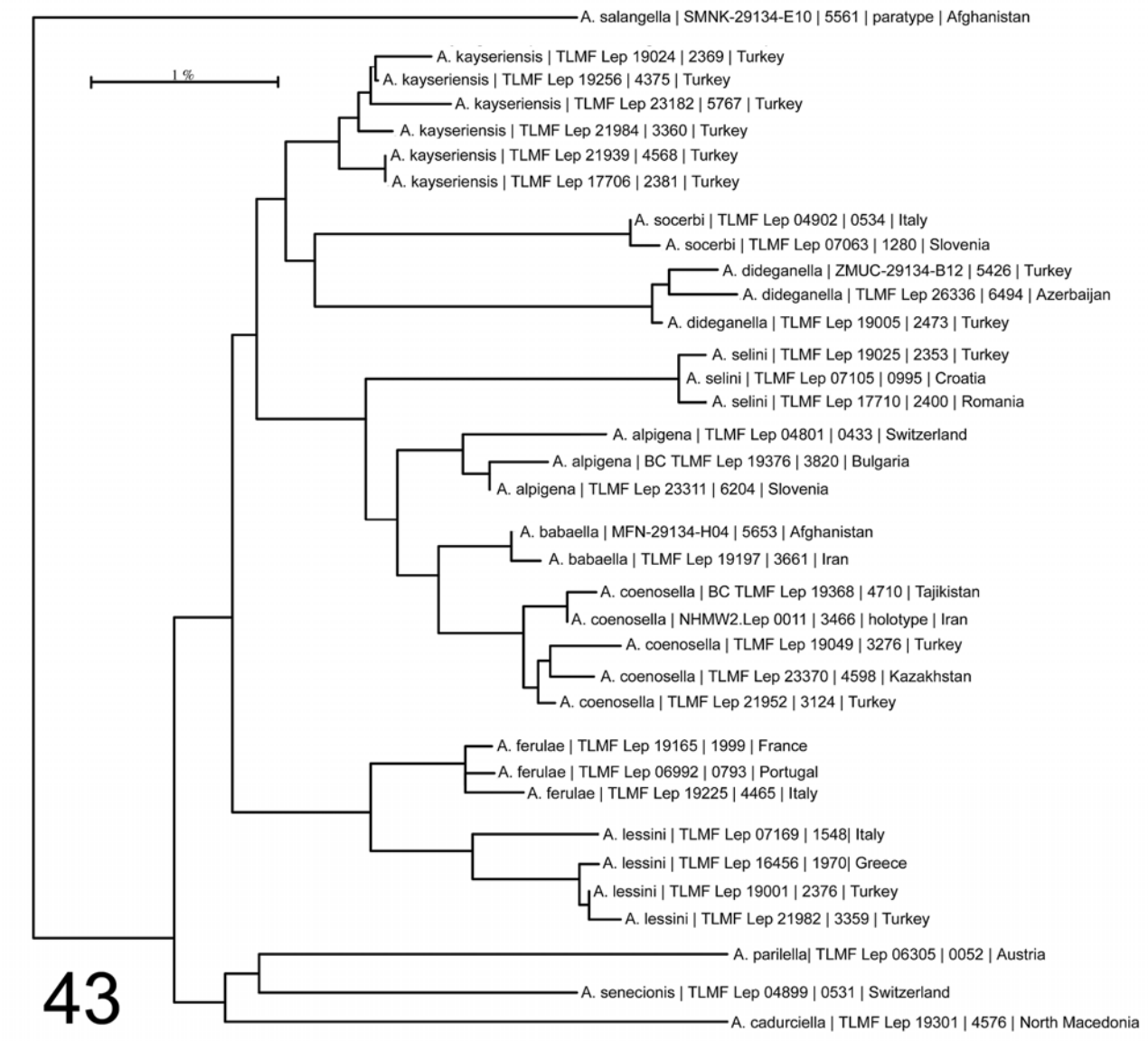


FIGURE 43: Neighbour-joining tree of *A. alpigena*-group - species, including the outgroup-species *A. salangella, A. parilella* (TREITSCHKE, 1835)*, A. senecionis* (NICKERL, 1864) and *A. cadurciella* (CHRÉTIEN, 1914).

Distribution

So far known from Turkey and Romania.

Biology

Foodplant unknown, but with all species from *A. alpigena*-group feeding on Apiaceae, as far as known, this can be expected in *A. kayseriensis* also. Fresh moths have been collected in June and first decade of July, from August onwards only worn specimens had been found with latest collection date 14. ix., which indicates, eggs are laid in summer and the species overwinters as egg or half grown larva, but with preimaginal stages unknown, the final answer must remain open.

Etymology

The name is derived from Kayseri Province (Turkey), where the specimens had been collected which were first recognized as belonging to an undescribed species

Acknowledgements

The author is most grateful to Dr Christian Wieser (LMK), Dr Mihai Stanescu (MGAB), Dr Martin Lödl and Dr Sabine Gaal-Haszler (NHMW), Hannes Baur and Hans-Peter Wymann (NMBE), Ing. Jan Šumpich (NMPC), Dr Robert Trusch (SMNK), Dr Peter Huemer (TLMF), Dr Sergey Sinev and Dr Alexander Lvovsky (ZIN) Dr Wolfram Mey (ZMHB), Mr Ole Karsholt (ZMUC), Günther Baisch (Germany), Knud Larsen (Denmark) and all further private collectors mentioned in this paper for the loan of specimens; the Canadian Centre for DNA Barcoding (Guelph, Canada), whose sequencing work was enabled by funding from the Government of Canada to Genome Canada through the Ontario Genomics Institute; Martin Corley for linguistic corrections and a final review and Prof Dr Ahmet Ö. Koçak for the offer to publish in this journal.

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